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Justifiability of Littering: An Empirical Investigation

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Abstract:

The paper investigates the relationship between environmental participation and littering. Previous empirical work in the area of littering is scarce as is evidence regarding the determinants of littering behavior. We address these deficiencies, demonstrating a strong empirical link between environmental participation and reduced public littering using European Values Survey (EVS) data for 30 Western and Eastern European countries. The results suggest that membership in environmental organizations strengthens commitment to anti-littering behaviour, thereby supporting improved environmental quality.

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1. Introduction

Consider the following illustrative case: during holiday periods, the bins at beaches and parks are full (or overflowing) with rubbish. The majority of campers/holidaymakers carefully collect and wrap their refuse before purposely driving to the bin and disposing of it. This action incurs a personal cost that could have been avoided by simply leaving the rubbish behind. How do people justify such a cost (without the threat of omnipresent police officers)? It has been argued that this voluntary compliance is primarily being driven by social norms or preferences for environmental protection. Voluntary compliance eliminates free-rider behavior and lays the foundation of cooperation and public good provision. Such a willingness to contribute to the environment is especially useful in situations where it is extraordinarily expensive to arrange an enforcement regime. As a consequence, voluntary compliance lowers the cost of the government's operations. Slemrod (2002) points out:

> "It is as if there is a stock of goodwill, or social capital, the return to which is the more efficient operation of government. This social capital stock may be reduced by a policy change that decreases the incentive to be a law-abiding citizen" (p. 13).

Decision makers are interested in the extent to which goodwill may be more or less present as they seek to avoid changing policy to the detriment of the existing incentives. Recent studies in the area of ecological economics have shown that social capital reduces transaction costs and increases the effectiveness of public environmental policies (Paavola and Adger, 2005; Erridge and Greer, 2002). Therefore, when suggesting policy prescriptions, factors such as the incidence of voluntary compliance with anti-littering norms, the conditions under which it takes place and the socio-demographic characteristics of those more likely to comply are of interest.

In recent times, a growing number of studies have been devoted to examining individual environmental preferences. Initial interest in environmental attitudes dates back to the early 1970s (Bord and O'Connor, 1997), and since then, an increasing number of economists have demonstrated interest in whether an individual's environmental morale or attitudes could help to reduce environmental degradation or the problems of free riding associated with public goods (Frey and Stutzer, 2006). Environmental morale or attitudes represent an inexpensive mechanism through which individuals are motivated to engage in collective action aimed at

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preserving the environment. Possible solutions for ensuring compliance include the option to 'force' people to cooperate. This is in line with deterrence theory based on the economics-of-crime approach, hypothesizing that individuals maximize expected utility, taking into account the probability of detection and the degree of punishment (Akers, 1990). However, empirical and experimental findings indicate that deterrence models predict too little compliance and the reality is that people are more cooperative than would be anticipated, even after taking into account the extent of their risk aversion. The literature suggests that **social norms** can help explain the high degree of compliance (Torgler, 2007). Prevailing social norms tend to generate increased individual cooperation in public good situations and, in some instances, in private good situations as well. There are both internal and external influences at work in these situations, both functioning in similar ways to motivate citizens to comply with the law. Violation of social norms results in negative consequences, such as internal sanctions (e.g. guilt, remorse) or external legal and social sanctions, such as embarrassment, gossip and ostracism (Grasmick et al., 1991). As Polinsky and Shavell (2000) point out, the corresponding literature focuses on the influence that social norms exert over individual behavior, and their role as a substitute for, or a supplement to, formal laws. There are complementarities between sources of external and internal sanctions: laws can influence social norms, however the effectiveness of laws depends on pre-existing social norms (O'Donnell, 2007). To this end, Rege and Telle (2001) suggest that social norms may explain why many individuals don't litter public places. If littering is not acceptable in a society, a "person throwing his ice-cream-paper on the street will feel social disapproval from people observing him… many people do not litter even if they know that nobody is observing them, because littering imposes a feeling of guilt" (p. 3). Feelings of guilt or shame restrict behavior, and can increase the costs of non-compliance with the law in the same way as legal sanctions (Grasmick et al., 1994).

To our knowledge, empirical papers on littering are scarce. Thus, this paper contributes to the literature by using a rich data set covering 30 countries at the individual level. Section 2 provides a brief overview of the existing literature on littering. In Section 3, we present our theoretical approach and develop our hypotheses. Section 4 presents the empirical results and Section 5 provides the conclusions.

2. Overview of the literature

Littering is considered as one of the most neglected yet is one of the most visible forms of environmental degradation (Finnie, 1973 p.123). A simple definition of litter is provided by Hansmann and Scholz, (2003, p.753): "the careless, incorrect disposal of minor amounts of waste". Items are discarded either actively or passively (Sibley and Liu, 2003), littering places such as parks, roads, paths, camping grounds, cafes, stores or other public buildings. Items such as cigarettes, bottles and other glass or plastic containers, napkins, bags, tissues, take-away food packages, snack wrappers, are frequently dropped in these locations, seriously damaging the environment. Some of those items are non-degradable, resulting in negative consequences for the environment and natural areas. Apart from the costs of employing someone to remove the litter, there are additional environmental costs to take into account. Unintentional littering can cause significant environmental damage in the wilderness, as it is not only visually ugly, but also potentially dangerous as a discarded live cigarette or a glass bottle could cause a devastating forest fire (Crump et al., 1977).

Litter differs from other kinds of pollution in that it is produced by the collective action of many individuals rather than by a small number of firms (Feld 1978). Since the production of litter is a collective action, from a socio-economic point of view, refraining from littering can be seen as a kind of cooperative and social behaviour which can improve social capital. The benefits derived from keeping outdoor public places clean are enjoyed by the wider community in terms of the positive amenity of the area, while the costs of producing the public good character are private (Anand, 2000). In general, two different ways of reducing this kind of littering behaviour have been defined (Geller et al. 1982). The first method holds that it is possible to change the antecedent conditions of littering behaviour using commitment, demonstration, and goal-setting strategies (Dwyer et al., 1993). Several studies have demonstrated the effectiveness of community education in encouraging environmentally responsible behaviours. For example, Taylor et al. (2007) found that education campaigns lead to reduced litter loads in stormwater, and Durdan et al. (1985) discovered that written prompts espousing positive messages such as "Please be helpful!" encouraged litter reduction in a cafeteria setting. Hansmann and Scholz (2003) employed a two-step informational strategy encouraging cinema patrons to dispose of refuse and achieved a 28.3% reduction in litter per person. Additionally, the level of formal education seems to exert a general

influence over littering behaviour: several surveys in US have shown that people with tertiary and post-graduate education have lower than average littering rates (Beck, 2007).

On the other hand, it is possible to find interventions that focus on the consequences of littering behaviour through either offering rewards for abstinence or imposing penalties/taxes (Fullerton and Wolverton, 2000; Ackerman, 1997; Huffman et al., 1995; Dobbs, 1991). While rewards can be applied ex-ante, penalties are applied ex-post. The imposition of a fine or a penalty on littering is a more direct approach to reduction of littering. However, there are alternative ways to achieve litter reductions such as social norms or rewards, taking into account that there is a low probability of catching someone littering and that it would be extremely expensive to substantially increase the enforcement efforts.

Due to the difficulty in applying a direct tax on littering behaviours, some indirect instruments have been proposed (Dobbs, 1991). For example, a tax on the use of plastic bags in retail outlets was introduced in Ireland during 2002. This change brought about a significant reduction in littering (around 90%), and resulted in positive landscape effects (Convery et al., 2007). It is also possible to design monetary incentives other than taxes to ensure the recycling of some non-degradable items. To this end, the literature provides some insights about the positive effects of recycling policies on littering reduction (Naughton, 1990).

In the interest of forming some generalisations, it is possible to identify several common findings on why people litter (Beck, 2007). It seems that younger people tend to litter more than older people. In addition, men litter more than women; clear support for previous research which finds that women are more concerned with environmental issues (Zelezny et al., 2000). Carelessness, laziness, the inconvenience of keeping the litter or accidents are some of the contributing factors in littering behavior. Cialdini et al. (1991) report a higher probability of littering in places where litter is already present compared to clean areas. This would suggest that if people notice other individuals are littering their willingness to litter increases, reducing the moral constraints which would ordinarily compel individuals to behave in an (ordinarily) socially accepted manner. Finnie (1973) and Heberlein (cited in Cialdini et al., 1991) also conclude that clean areas remain clean. Thus, an individual's behavior is likely to be influenced by their perception of the behavior of other citizens. Krauss et al. (1976, p.112) offer an explanation for this phenomenon: "…any norm violation that is observed tends to weaken the norm by detracting from its social validity".

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Despite litter in public places being recognized as a major public health and safety hazard and diminishing the aesthetic appearance of public places (Ackerman, 1997), to our knowledge only a few empirical studies have accurately analysed the acceptability of littering according to citizens' actual opinions. In practice, it is possible to observe that some kinds of litter are more socially tolerable than others. For example, some authors stress that littering resulting from certain items like cigarettes on the street (Cope et al., 1993) and organic litter in green areas (Beck, 2007) are perceived as more socially acceptable than littering due to other objects being discarded. Furthermore, the acceptability increases when people perceive that they do not share any responsibility for cleaning public areas, because it is an issue to be solved by the public sector. Thus, it can be acceptable to litter in areas where someone else will clean up (Beck, 2007).

This may be the case in urban areas, where Cialdini et al. (1991) conducted their study, however it can be contrasted with the results obtained by Crump et al. (1977) on littering behaviour in a forest environment. Their experiments found the opposite to be true: people visiting a heavily littered picnic area would pick up the majority of the rubbish before starting their lunch. The researchers propose that this difference in behaviour can be partly attributed to the different settings: there is quite a marked psychological difference between 60 pieces of litter in an urban environment and 60 pieces of litter in a forest environment. Picnickers are also likely to remain in a picnic area for a longer period of time than they would remain in a city street, and Crump et al. suggest that this difference could be responsible for the discrepancy in littering behaviours between urban environments and forest environments.

While previous surveys have analysed attitudes to littering, according to Beck (2007), these surveys[1] are "*not always comparable, due in part to the way in which questions were framed. In some cases, the report did not indicate details of the survey questions as much as hoped*". Only four of those surveys posed a question regarding the justification or acceptability of littering. The results in each case differed, which causes difficulties in drawing any generalized conclusions[2]. In addition, there is a complete lack of papers addressing the issue of environmental participation and its impact on littering.

[1] In this respect, Beck (2007) referred to some previous surveys carried out in different places, located primarily in the US and Australia.

[2] For example, in the Australian (1997) and Georgian (US, 2006) surveys, high percentages of non-acceptability were found (76% and 95% respectively). However, people from Iowa (US, 2001) considered littering as a minor issue, so the acceptability was high. In the

An interesting contribution of this paper is the observation of factors influencing the justification or acceptability of littering from an international point of view. Comparing different areas of the world can give us some clues with respect to individual environmental preferences and morale, while at the same time allowing characterization of people who do not justify these kinds of behaviours. Moreover, we will see whether results obtained in other areas of compliance literature are similar to the results with respect to littering behaviours.

3. Empirical approach

Economists are becoming increasingly interested in the use of survey data. For example, research that deals with social capital, corruption, happiness and tax compliance explores the causes of attitudes using other attitudinal variables as independent factors (cf. Diener and Suh, 2000; Brewer and Steenbergen, 2002; Uslaner, 2004; Brewer et al., 2004; and Chang and Chu, 2006 and Torgler, 2007). In this paper, we use survey data to investigate the correlation between the justifiability of littering and the participation in environmental organizations.

3.1 Data set

Rather than employ experimental studies (commonly used in behavioural literature), we analyse survey data provided by the European Values Survey (EVS) 1999/2000, which is a European-wide investigation of socio-cultural and political change. The survey collects data on the basic values and beliefs of people throughout Europe. The EVS was first carried out from 1981 to 1983, then in 1990 to 1991 and again in 1999 through 2001, with an increasing number of countries participating over time. The methodological approach is explained in detail in the European Values Survey (1999) source book, which provides information on response rates, the stages of sampling procedures, the translation of the questionnaire, and field work, along with measures of coding reliability, reliability of data, and data checks. All country surveys are conducted by experienced professional survey organizations, with the exception of Greece. Interviews are face-to-face and those interviewed are adult citizens aged 18 years and older. Tilburg University coordinates the project and provides the guidelines to guarantee the use of standardized information in the surveys and the national representativeness of the data. To avoid framing biases, the questions are asked in a prescribed order. The response rates vary from country to country. However, the average response rate is around 60 percent.

Washington survey (US, 1999) the majority of people thought that littering was acceptable if there was no receptacle nearby. An additional discrepancy is that several differences among the explanatory factors can be observed between the surveys.

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Because EVS asks an identical set of questions in various European countries, the survey provides a unique opportunity to examine the impact of conditional cooperation on environmental morale and preferences. This paper considers 30 representative national samples of at least 1,000 individuals in each country. The survey permits us to work with a representative set of individuals, covering a large set of countries.

In general, the EVS has been designed as a wide-ranging survey, where the danger of framing effects is reduced compared with many other surveys that focus entirely on environmental questions. However, we note that the available data are based on self-reports, and that subjects may tend to overstate their degree of cooperation.

3.2 Dependent variable

We use the following question to assess the justifiability of littering:

> *Please tell me for each of the following statements whether you think it is always justified, never justified, or somewhere in between: … Throwing away litter in a public place.*

A ten-scale index is used for this question, with the two extremes being 'never justified' and 'always justified'. The natural cut-off point is the value 1, where a high amount of respondents assert that throwing away litter in a public place is 'never justified' (68.3 percent). Thus, our environmental morale variable takes the value 1 if the respondent says that throwing away litter in a public place is 'never justified', and zero otherwise. We can therefore express the model as:

$$y_i = \beta_i x_i + \mu_i \qquad (1)$$

Where y_i refers to the justifiability of littering and x_i to the independent variables and u_i to a disturbance process. We will estimate the parameters using a probit (binary-choice) model by implementing maximum likelihood techniques.

3.3 Independent variables

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The previous literature on the social norm of compliance provides a good foundation as to the type of empirical model used to explore the justifiability of littering.

1. ENVIRONMENTAL PARTICIPATION. The following question is used to measure environmental participation:

> *Please look carefully at the following list of voluntary organizations and activities and say which, if any, do you belong to? Conservation, the environment, ecology, animal rights (1=mentioned, 0=not mentioned).*

Krauss et al. (1976) discovered a significantly negative relationship between environmental activism and littering by conducting an experiment in the streets of New York. Researchers approached pedestrians, requested them to sign an anti-littering petition, and observed their subsequent behavior to determine their rates of littering. It was discovered that those asked to sign the petition were littering less than half as often as others. Roales-Nieto (1988) also observed a significant reduction in littering when some volunteers cleaned the dirtiest areas of their neighbourhood. This kind of behaviour represents some elements of social capital, such as networks and civic participation. It is possible to identify different levels of participation in environmental activism. On one level are the citizens who are members of environmental organizations but only participate from a financial point of view. On another level are the individuals who participate actively, and become involved in the undertakings of the organization. Martinez and McMullin (2004) classified an active member as a person who donated time to the environmental organization and a non-active member as one who only paid membership fees. In this paper, we consider both classes of participation, recognizing that monetary contributions can be useful in funding active pro-environmental programs.

2. AGE. Instead of using age as a continuous variable, four classes have been formed: 16-29, 30-49, 50-64, 65+, with 16-29 as reference group. In analysing the influence of age, it is argued that that social position is a key in explaining the age effect. Tittle (1980) explains that as individuals age, they acquire greater social stakes such as

material goods, status and a stronger dependency on the reactions from others. Avoiding exclusion as a motivation for pro-environmental behaviour represents both compliance with social norms and a recognition of socially appropriate behaviour (Bamberg and Möser, 2007). Thus, the potential costs of non-compliance are increased and we observe that compliance increases with age. The literature on tax morale, for example, provides support for this age effect (see Torgler, 2007). The criminology literature has extensively explored the impact of age and crime and provides evidence of a strong age effect.

3. GENDER. Experimental and empirical studies have established the existence of gender differences in areas such as charitable giving, tax morale, corruption, bargaining or household decision making, and environmental preferences (Brown-Kruse and Hummels, 1993; Nowell and Tinkler, 1994; Andreoni and Vesterlund, 2001; Torgler, 2007, Torgler and Valev 2007, Torgler et al. 2008). The social norm literature clearly indicates that women are more willing to comply with society's rules (Torgler 2007). It is often argued that traditional gender socialization influences women through both overt and covert encouragements to be cooperative and behave in a compassionate manner. This socialization is reinforced by cultural norms and the role of women as caregivers and nurturers, leading women to exhibit a higher concern for the maintenance of life and therefore for the environment. In addition, the "traditional" domain of working at home is related to an increased likelihood of engaging in private behaviors aimed at the preservation of the environment (for an overview see Hunter et al., 2004).

4. EDUCATION[3] AND POLITICAL INTEREST. Torgler and Garcia-Valiñas (2007) stress it is not only formal education that has the potential to impact on environmental preferences, but also informal education. Previous literature demonstrates that formal education[4] has a significantly positive influence on willingness to contribute to

[3] Formal education: At what age did you complete or will you complete your full time education, either at school or at an institution of higher education? Please exclude apprenticeships. Informal education/political discussion: When you get together with friends, would you say you discuss political matters frequently, occasionally or never (3=frequently, 2=occasionally, 1=never)?

[4] Formal education is usually expressed as the level of education or degrees a person has obtained. It can alternatively be expressed as the number of years spent in education (Blomquist and Whitehead, 1998).

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environmental quality (Blomquist and Whitehead, 1998; Engel and Pötschke, 1998; Witzke and Urfei, 2001; Veisten et al., 2004). The literature has also indicated that informal education is important and is represented in this analysis by a self-reported tendency to discuss political matters (Whitehead, 1991; Blomquist and Whitehead, 1998; Carlsson and Johansson-Stenman, 2000; Hidano et al., 2005). For this reason, we include both formal and informal education in our analysis. One possible method of capturing the level of informal education is to measure the extent of individuals' political interest[5]. It can be assumed that politically interested people are well-informed and have a high level of current knowledge about what is going on in politics. It is therefore anticipated that these citizens may be more aware of environmental issues and problems, leading to a higher willingness to contribute to pro-environmental actions. Regardless of whether the education was gained through a formal or an informal process, it is anticipated that well-informed citizens are more aware of environmental issues and problems and have stronger environmental attitudes, because they are more knowledgeable about the possible damage (Danielson et al., 1995; Torgler and Garcia-Valiñas, 2007).

5. MARITAL STATUS. Tittle (1980) states, "A long tradition in sociology, extending back to Durkheim, postulates that proneness toward rule breaking varies inversely with the extent to which individuals are involved in social networks with constraining content" (p. 111). This would imply that married people are more compliant than others, especially compared to singles because they are more constrained by their social network. Furthermore, married people might be more concerned with local environmental problems than singles as the "parent effect" makes them seek their children's future welfare (Dupont, 2004).

6. The ECONOMIC SITUATION of an individual is another significant variable considered. We use a proxy that measures the socio-economic status of respondents (upper class, middle class, lowest class). It can be argued that a clean environment is not only a public good, but also a normal good. Thus, demand may increase with income (Franzen, 2003). Wealthier citizens may have a higher demand for a clean environment. Income has in general been considered in the previous empirical literature (Whitehead, 1991; Stevens et al., 1994; Blomquist and

[5] Question: 'When you get together with your friends, would you say you discuss political matters frequently, occasionally or never?'.

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Whitehead, 1998; Popp, 2001; Witzke and Urfei, 2001; Bulte et al., 2005; Dupont, 2004; Israel and Levinson, 2004; Veisten et al., 2004; Hidano et al., 2005). Usually, a positive relationship between income and environmental willingness to contribute has been found.

7. An additional variable that both approximates and complements the economic situation of individuals is their OCCUPATION STATUS. Witzke and Urfei (2001) found that some labour groups, such as persons engaged in the household or on maternity leave, had higher environmental preferences. Veisten et al. (2004) showed that unemployed people present, occasionally, lower preferences for environmental protection policies. However, the latter relationship sometimes is neither clear nor significant at all (Engel and Pötschke, 1998; Witzke and Urfei, 2001).

8. CHURCH ATTENDANCE[6]. This variable is a proxy for religiosity. It has the advantage of measuring an approximation of how much time individuals devote to religion, instead of directly enquiring about the degree of religiosity. The church as an institution induces behavioral norms and moral constraints among their community. Some papers in the criminology literature found a negative correlation between religious membership and crime (see, e.g., Hull, 2000; Hull and Bold, 1989; Lipford, McCormick and Tollison, 1993). Religiosity seems to affect the degree of rule breaking and the social norm of compliance, and can thus be seen as a restriction on engaging in deviant behavior with respect to littering.

4. Econometric results

Our multivariate analysis includes the discussed vector of control variables. In some estimates we differentiate between the two different regions of Europe (i.e. Western and Eastern Europe) because of the effects of the

[6] Apart from weddings, funerals and christenings, how often do you attend religious services these days? More than once a week, once a week, once a month, only on special holy days, once a year, less often, practically never or never (8= more than once a week to 1=practically never or never).

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reform process in the transition countries. The rapid collapse of institutional structures in Eastern European countries produced a vacuum in many, if not all, of these countries. This led to large social costs, especially in terms of worsening income inequalities, increasing poverty and poor institutional conditions resulting from uncertainty and high transaction costs. Torgler (2003) and Alm et al. (2006) show that such circumstances have an impact on social norms. In other estimations we employ country fixed effects or standard errors adjusted for the clustering on 30 countries, which accounts for unobservable country-specific characteristics.

Table 1 presents the first results of the multivariate analysis. In these first estimates, we exclude income because the ten-point income scale in the EVS is based on national currencies, rendering a cross-country comparison unreliable and therefore irrelevant..[7] The self-classification of the respondents' economic situation into various economic classes may be used as a proxy. However, data for this purpose has not been collected in all countries. Thus, we include economic status sequentially in the specification (see *Table 2*). In general, a probit estimation is appropriate as it takes into account the ranking information of the scaled dependent variables. To measure the quantitative effect of this variable, we calculate the marginal effects, because the equation is nonlinear. Marginal effects indicate the change in the probability of individuals having a specific level of justifiability of littering when the independent variable increases by one unit. Weighted estimates are employed to ensure that the samples correspond to the national distribution.[8] Furthermore, answers such as 'don't know' and missing values are eliminated in all estimations.

Table 1 firstly presents in specification (1) a regression with a regional dummy variable, namely WESTERN EUROPE. Specification (2) goes a step further using country fixed effects. In specification (3) we present standard errors adjusted for the clustering on 30 countries. Compared to specification (1), coefficient and marginal effect values remain the same. Thus, clustering leads to a decrease in the *z*-values but it has no impact on the marginal effects. Adding country fixed effects leads to a strong increase in the Pseudo R2 value. Consistent with our main prediction, the estimation results in *Table 1* indicate that membership of an environmental organization increases the probability of stating that littering is never justifiable by around 4 percentage points. The coefficient is statistically significant in all three specifications and the size of the effect is substantial. As *Table 2* indicates, the results remain robust when including the proxies for individuals' economic situation. Thus, there is a strong relationship between participating in an environmental organization and not littering. In general, the results on the justifiability of littering are in line with the literature on social norms or morality, such as tax morale (Torgler, 2007). Age is positively correlated with the justifiability of littering. As people get older, the justifiability decreases. The results indicate that the peak is reached between 50 and 69 (see marginal effects) in both tables. Women are more willing to refrain from littering than are men. For example, specification (2) reports that being a woman rather than a man increases the probability of stating that littering is never justifiable by 5.4 percentage points. This result is in agreement with the findings of the previous literature, in the sense that women are more concerned with the environment than men. As predicted, married people show the highest level of willingness not to litter. Less robust findings are observed for the formal education and church attendance. Most of

[7] Moreover, income is coded on a scale from 1 to 10 and these income intervals are not fully comparable across countries.

[8] The weighting variable is provided by the EVS.

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the coefficients on formal education are not statistically significant. Church attendance is only statistically significant in specification (1) and (4). Interestingly, students report the lowest willingness to litter, followed by part-time employees. On the other hand, unemployed people report a high level of compliance with anti-littering rules. It should be noted that the results in the tables are always in relation to the reference group (full-time employed). Finally, specification (1) also reports significant differences between East and West Europe. However, the significant difference disappears once a clustering method is implemented or the economic situation is controlled for.

However, the causality is not clear and it is reasonable to question the direction of causality in the results. There may be a potential *selection bias*. People with strong environmental preferences may choose to participate in a voluntary environmental organization and such an argument would imply a reverse causality. To control for such a problem, we will use an instrumental approach to check the robustness of the results. A suitable instrument must be contemporaneously uncorrelated with the error term but must be highly correlated with a membership in a voluntary environmental organization. We use an index of concerns regarding the living conditions of others[9]. *Table 3* reports the results of two-stage least squares (2SLS) estimations together with the first stage regressions. It shows that the instruments and the *F*-tests for the instrument exclusion set in the first-stage regression are statistically significant. We also report the Anderson canonical correlations LR test for the relevance of the instruments, checking the relevance of the excluded instruments. A rejection of the null hypothesis indicates that the model is identified and that the instruments are relevant (see Hall, Rudebusch and Wilcox 1996). We also report the Anderson-Rubin test that the endogenous variables are jointly statistically significant. The test has the advantage of being robust to the presence of weak instruments. *Table 3* reports that in all cases the Anderson canonical correlations LR test shows rejection of the null hypothesis, which indicates that the models are identified and that the instruments are relevant. The Anderson-Rubin test is also statistically significant.

5. Conclusions

This paper investigates the determinants of littering at the individual level using a large recent dataset covering 30 countries (EVS data for Western and Eastern European countries). Such an analysis is relevant as

[9]Concerned about the living conditions of elderly, unemployed, immigrants, sick and disabled people, immediate family, people in your neighbourhood, people of the region you live in, your fellow countrymen, Europeans, Human kind (for each factor: 1=not all, 5=very much). We define this variable as CARE INDEX.

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there is a lack of empirical evidence in the area of littering and only a limited number of studies exploring in any detail the determinants of social norms of compliance regarding the environment.

In summary, we have demonstrated that non-married men between 50-59 years old are the most willing to justify littering. We have also observed that formal education is not very significant as a determinant of littering behaviour. The results remain robust after dealing with potential causality issues.

As the previous literature has shown, this kind of behaviour should be addressed by specific educational campaigns to ensure effective reduction. (Taylor et al., 2007). If the undesirable behaviour has become habitually entrenched in a community, it will require implementation of more socially involved education techniques to achieve significant littering reductions. Such techniques would employ verbal prompts, which seem to be more effective than written prompts or signals. Higher proximity and interaction with people requires higher efforts and costs, but usually results in better outcomes and diminished littering (Huffman et al. 1995). In this respect, our findings are quite useful in determining towards which group of people educational campaigns should be orientated.

The results of the study have implications especially in those areas where litter is a significant problem. City councils spend large sums of money to clean up litter. Heavy fines and strict law enforcement have been employed to discourage littering yet have not met with great success in some places. The empirical exploration of individuals' willingness to litter undertaken in this paper seeks to establish the determinants of littering; keeping in mind htat such results can also be useful for decision makers. Investigating the determinants of littering behavior underlines the importance of using a rich set of theories to fully understand what influences people's willingness to contribute to improving outcomes. We discovered an important positive impact of social capital (by means of participation in environmental organizations) on justification of littering and environmental morale. It is possible that encouraging individuals to become active in environmental organizations will help prevent littering, which is an interesting implication for policymakers.

This relationship between social capital, social norms, and voluntary compliance has the potential to bring about positive environmental outcomes in other fields. The interesting and attractive feature of this behavior is its

voluntary nature. Such behavior is not only cost effective but can be more effective in areas where law enforcement and market incentives fail.

Understanding what shapes the justifiability of littering needs to be investigated further as only a limited number of studies have explored the relevance of social norms in the area of littering. A good understanding of the interactions between environmental morale and preferences and perceived environmental cooperation, and the factors strengthening these relationships, has the potential to bring about better environmental outcomes.

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Table 1
Determinants of the Justifiability of Littering (I)

	Coeff.	*z-Stat.*	*Marg. Effects*	*Coeff.*	*z-Stat.*	*Marg. Effects*	*Coeff.*	*z-Stat.*	*Marg. Effects*
	WEIGHTED PROBIT			*WEIGHTED PROBIT*			*WEIGHTED PROBIT*		
DEPENDENT V.	JUSTIFIABILITY OF LITTERING			JUSTIFIABILITY OF LITTERING			JUSTIFIABILITY OF LITTERING		
	Robust standard errors			*country fixed effects*			*standard errors adjusted for the clustering on 30 countries*		
	(1)			(2)			(3)		
Voluntary Organization									
Environ. Organization	0.119***	3.49	0.041	0.111***	3.03	0.038	0.119**	2.26	0.041
Demographic Factors									
AGE 30-39	0.108***	4.16	0.038	0.102***	3.82	0.035	0.108***	3.05	0.038
AGE 40-49	0.173***	6.29	0.060	0.170***	5.95	0.058	0.173***	4.49	0.060
AGE 50-59	0.237***	7.87	0.081	0.262***	8.42	0.086	0.237***	5.02	0.081
AGE 60-69	0.285***	7.66	0.096	0.330***	8.56	0.107	0.285***	4.09	0.096
AGE 70+	0.244***	5.59	0.082	0.319***	7.08	0.103	0.244***	2.92	0.082
WOMAN	0.100***	6.10	0.036	0.154***	9.08	0.054	0.100***	3.60	0.036
Formal and Informal Educ.									
EDUCATION	-0.001	-0.46	0.000	0.002	1.20	0.001	-0.001	-0.14	0.000
POLITICAL DISCUSSION	-0.018	-1.55	-0.007	0.019	1.55	0.007	-0.018	-0.74	-0.007
Marital Status									
WIDOWED	-0.052*	-1.71	-0.019	-0.072**	-2.26	-0.025	-0.052	-1.13	-0.019
DIVORCED	-0.091***	-3.08	-0.033	-0.068**	-2.26	-0.024	-0.091**	-2.33	-0.033
SEPARATED	-0.132**	-2.26	-0.048	-0.170***	-2.78	-0.061	-0.132**	-2.24	-0.048
NEVER MARRIED	-0.132***	-5.70	-0.048	-0.162***	-6.72	-0.058	-0.132***	-3.23	-0.048
Employment Status									
PART TIME EMPLOYEE	-0.122**	-4.00	-0.044	-0.085***	-2.72	-0.030	-0.122**	-2.44	-0.044
SELFEMPLOYED	0.034	0.99	0.012	0.000	-0.01	0.000	0.034	0.74	0.012
UNEMPLOYED	0.118***	3.83	0.041	0.091***	2.84	0.031	0.118***	2.66	0.041
AT HOME	0.152***	4.96	0.052	0.002	0.07	0.001	0.152**	2.08	0.052
STUDENT	-0.152***	-4.05	-0.056	-0.177***	-4.56	-0.064	-0.152***	-3.53	-0.056
RETIRED	0.012	0.40	0.004	-0.004	-0.13	-0.001	0.012	0.30	0.004
OTHER	0.058	0.99	0.020	0.028	0.48	0.010	0.058	0.66	0.020
Religiosity									
CHURCH ATTENDANCE	0.011***	3.54	0.004	-0.003	-0.75	-0.001	0.011	0.76	0.004
Region									
WESTERN EUROPE	-0.065***	-4.24	-0.023	Country fixed	eff.		-0.065	-0.50	-0.023
Pseudo R2	0.021			0.085			0.021		
Number of observations	37356			37356			37356		
Prob > chi2	0.000			0.000			0.000		

Notes: The reference group consists of AGE<30, MAN, MARRIED, FULL-TIME EMPLOYEE, EASTERN EUROPE. The symbols *, **, * represent statistical significance at the 10%, 5% and 1% levels, respectively.

Table 2

Determinants of the Justifiability of Littering (II)

	Coeff.	*z-Stat.*	*Marg. Effects*	*Coeff.*	*z-Stat.*	*Marg. Effects*
	WEIGHTED PROBIT			*WEIGHTED PROBIT*		
DEPENDENT V.	JUSTIFIABILITY OF LITTERING			JUSTIFIABILITY OF LITTERING		
	Robust standard errors			*country fixed effects*		
	(4)			(5)		
Voluntary Organization						
Environ. Organization	0.115**	2.28	0.040	0.116**	2.25	0.039
Demographic Factors						
AGE 30-39	0.085**	2.33	0.030	0.097**	2.57	0.033
AGE 40-49	0.136***	3.46	0.047	0.135***	3.28	0.046
AGE 50-59	0.201***	4.75	0.069	0.230***	5.21	0.076
AGE 60-69	0.155***	3.00	0.054	0.225***	4.16	0.075
AGE 70+	0.026	0.43	0.009	0.149**	2.36	0.050
WOMAN	0.039	1.63	0.014	0.113***	4.60	0.039
Formal and Informal Educ.						
EDUCATION	-0.006**	-2.26	-0.002	-0.004	-1.36	-0.001
POLITICAL DISCUSSION	-0.030*	-1.79	-0.011	0.027	1.51	0.009
Income						
UPPER CLASS	-0.047	-1.37	-0.017	-0.070*	-1.91	-0.024
MIDDLE CLASS	-0.109***	-4.39	-0.039	-0.059**	-2.26	-0.021
Marital Status						
WIDOWED	-0.035	-0.77	-0.012	-0.052	-1.10	-0.018
DIVORCED	-0.158***	-3.54	-0.058	-0.112**	-2.45	-0.040
SEPARATED	-0.181**	-2.10	-0.067	-0.263***	-2.88	-0.097
NEVER MARRIED	-0.094***	-2.84	-0.034	-0.149***	-4.27	-0.053
Employment Status						
PART TIME EMPLOYEE	-0.037	-0.80	-0.013	-0.016	-0.35	-0.006
SELFEMPLOYED	0.095**	2.00	0.033	-0.004	-0.08	-0.001
UNEMPLOYED	0.211***	4.96	0.073	0.181***	4.08	0.061
AT HOME	0.221***	5.39	0.075	0.013	0.29	0.004
STUDENT	-0.124**	-2.22	-0.045	-0.138**	-2.37	-0.049
RETIRED	-0.021	-0.48	-0.008	-0.026	-0.58	-0.009
OTHER	0.041	0.53	0.015	0.016	0.21	0.006
Religiosity						
CHURCH ATTENDANCE	0.021***	5.19	0.008	-0.003	-0.62	-0.001
Region						
WESTERN EUROPE	0.011	0.46	0.004			
Pseudo R2	0.021			0.102		
Number of observations	19305			19305		
Prob > chi2	0.000			0.000		

Notes: The reference group consists of AGE<30, MAN, MARRIED, FULL-TIME EMPLOYEE, LOWEST CLASS, EASTERN EUROPE. T
symbols *, **, *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

<additional information>

Table 3
Determinants of the Justifiability of Littering (III)

	Coeff.	*t-Stat.*	*Coeff.*	*t-Stat.*	*Coeff.*	*t-Stat.*	*Coeff.*	*t-Stat.*
	WEIGHTED 2SLS		*FIRST STAGE REGRESSION*		*WEIGHTED 2SLS*		*FIRST STAGE REGRESSION*	
DEPENDENT V.	JUSTIFIABILITY OF LITTERING (6)				JUSTIFIABILITY OF LITTERING (7)			
Voluntary Organization								
Environ. Organization	5.364***	5.83			3.701	4.57		
Demographic Factors								
AGE 30-39	0.017	0.70	0.003	0.69	0.047*	1.86	-0.004	-0.69
AGE 40-49	0.018	0.71	0.006	1.49	0.042	1.55	0.001	0.09
AGE 50-59	-0.012	-0.37	0.017***	3.50	0.021	0.64	0.014*	1.89
AGE 60-69	0.037	1.03	0.012**	2.11	0.066*	1.95	0.002	0.22
AGE 70+	0.048	1.20	0.009	1.41	0.065	1.62	-0.005	-0.50
WOMAN	0.008	0.45	0.007***	2.70	0.007	0.41	0.007*	1.75
Formal and Informal Educ.								
EDUCATION	-0.013***	-4.47	0.003***	8.40	-0.011***	-3.59	0.003***	5.01
POLITICAL DISCUSSION	-0.066***	-3.92	0.012***	6.03	-0.049***	-2.77	0.014***	4.66
Income								
UPPER CLASS					-0.103***	-3.15	0.021***	3.15
MIDDLE CLASS					-0.050***	-2.72	0.008**	2.04
Marital Status								
WIDOWED	0.037	1.38	-0.010**	-2.41	0.009	0.31	-0.005	-0.87
DIVORCED	0.026	0.95	-0.009*	-1.90	0.011	0.34	-0.012*	-1.71
SEPARATED	-0.042	-0.75	-0.002	-0.16	-0.131**	-2.05	0.013	0.84
NEVER MARRIED	-0.091***	-3.96	0.007*	1.71	-0.076***	-3.14	0.007	1.25
Employment Status								
PART TIME EMPLOYEE	-0.092***	-2.59	0.010*	1.72	-0.073*	-1.85	0.016*	1.70
SELFEMPLOYED	-0.060*	-1.66	0.012*	1.89	-0.040	-1.11	0.011	1.29
UNEMPLOYED	0.062**	2.28	-0.007	-1.61	0.068**	2.50	-0.005	-0.76
AT HOME	0.042	1.59	-0.008*	-1.94	0.004	0.17	-0.002	-0.26
STUDENT	-0.036	-0.93	-0.006	-0.94	-0.007	-0.16	-0.014	-1.51
RETIRED	0.026	1.14	-0.006	-1.51	-0.027	-0.96	0.003	0.49
OTHER	-0.045	-0.72	0.010	0.92	-0.044	-0.72	0.012	0.83
Religiosity								

CHURCH ATTENDANCE	-0.002	-0.60	0.000	-0.05	0.000	-0.05	-0.001	-0.70
REGIONS	country fixed effects				country fixed effects			
Instrument:								
Care index			0.001***	6.30			0.001***	5.22
Test of excluded instruments			39.67***				27.29***	
Anderson canon. cor. LR statistic	40.091***				30.65***			
Anderson-Rubin test	216.98***				80.82***			
Number of observations	35229				18433			
Prob > F	0.000				0.000			

Notes: The reference group consists of AGE<30, MAN, MARRIED, FULL-TIME EMPLOYEE,. The symbols *, **, *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

<additional information>

APPENDIX

Table A1

Countries

Western European Countries	**Eastern European Countries**
Germany	Belarus
Austria	Bulgaria
Belgium	Croatia
Denmark	Czech Republic
Finland	Estonia
France	Greece
Great Britain	Hungary
Iceland	Latvia
Ireland	Lithuania
Italy	Poland
Malta	Romania
Netherlands	Russia
North Ireland	Slovak Republic
Portugal	Ukraine
Spain	
Sweden	

<additional information>

Table A2

Descriptive Statistics

VARIABLES	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
JUSTIFIABILITY OF LITTERING	40674	0.683	0.465	0	1
ENVIRON. ORGANIZATION	41125	0.049	0.216	0	1
AGE 30-39	40963	0.197	0.398	0	1
AGE 40-49	40963	0.191	0.393	0	1
AGE 50-59	40963	0.150	0.357	0	1
AGE 60-69	40963	0.135	0.342	0	1
AGE 70+	40963	0.102	0.302	0	1
WOMAN	41114	0.540	0.498	0	1
EDUCATION	39840	18.712	5.125	5	74
POLITICAL DISCUSSION	40713	1.886	0.654	1	3
UPPER CLASS	21335	0.136	0.343	0	1
MIDDLE CLASS	21335	0.338	0.473	0	1
WIDOWED	39861	0.097	0.295	0	1
DIVORCED	39861	0.070	0.256	0	1
SEPARATED	39861	0.016	0.124	0	1
NEVER MARRIED	39861	0.228	0.420	0	1
PART TIME EMPLOYEE	40919	0.068	0.252	0	1
SELFEMPLOYED	40919	0.052	0.222	0	1
UNEMPLOYED	40919	0.229	0.420	0	1
AT HOME	40919	0.095	0.293	0	1
STUDENT	40919	0.061	0.240	0	1
RETIRED	40919	0.073	0.261	0	1
OTHER	40919	0.018	0.131	0	1
CHURCH ATTENDANCE	40762	3.871	2.456	1	8
INSTRUMENT					
CARE	38540	34.863	7.727	11	55

<additional information>